

Preface

This issue of the *IBM Systems Journal* focuses on the role of large systems and the evolution of the architectural enhancements used to meet present application requirements. Those enhancements provide the capabilities to allow expansion to meet the demands anticipated in the 1990s.

The announcement of the Enterprise Systems Architecture (ESA), the IBM Enterprise Systems Architecture/370™ (ESA/370™) family of systems and supporting products, and the Multiple Virtual Storage/Enterprise Systems Architecture (MVS/ESA™) offers a major step toward meeting the projected increased data processing requirements of large systems for the 1990s. ESA represents a significant milestone in the use of large systems in that it brings more efficient architectural and system software capabilities to bear on the applications of today's large-systems users. Aken's paper provides an overview of the requirements for large systems in the future and the thoughtful approach taken in the development of ESA/370 from the existing architecture.

The paper by Scalzi, Ganek, and Schmalz discusses the major architectural capabilities of ESA/370. The authors review developments in IBM's large-systems architecture during the past three decades, and they cite the advancements obtained by each successive architecture, such as improving security, reliability, integrity, and performance, and eliminating constraints on growth.

ESA/370 allows increased isolation of both data and programs in separate address spaces. Plambeck describes the access register and the program-linkage mechanisms that provide efficient, controlled means of reaching other address spaces. Several benefits are derived, which include increased reliability, available storage in common and private areas, and an increased total amount of data without the aid of control program intervention.

ESA/370 utilizes the new technologies available for electronic storage. Cohen, King, and Brady discuss aspects of electronic storage hierarchies. They detail

the trade-offs between the storage technologies and the interactions among the levels of storage hierarchies.

The paper by Gelb discusses system-managed storage, an evolutionary concept which culminated in a resource manager for external storage that separates the logical view of data from the physical device characteristics. New products are supported that simplify the interfaces for the use and administration of storage. They integrate the functions of storage management and provide functions to effect complex-wide management of external storage resources.

The paper by Borden, Hennessy, and Rymarczyk discusses the progression in operating systems for large systems offered by IBM. The diversity of computer applications, from transaction processing to engineering design simulation, results in unique demands that have led to the development of many different programming languages, application programs, and operating systems. The system design trade-offs coupled with the necessity for compatibility imply that the design of a single operating system could not satisfy the burgeoning range of requirements. Several designs have resulted, each addressing a segment of applications.

As large computing systems continue to grow in capacity and offer new technology, there is a trend to consolidate systems into one processor complex. Each of the operating systems has remained viable while it has evolved to meet new applications. The result is that multiple operating systems must be run on a single complex. The paper by Borden et al. describes the PR/SM™ capability to run multiple operating systems on a single IBM 3090E or ES/3090S processor complex.

Certain operating system features allow application programs to use the large amounts of virtual storage made available by Enterprise Systems Architecture. The articles by Clark and Rubsam discuss the evolution of MVS/ESA. ESA/370 is implemented and available on the IBM 3090 Model E and the 3090 Model

S series processors and on the IBM 4381 Model Groups 91E and 92E. These processors are capable of executing software developed for both the System/370 Extended Architecture (370-XA) and the new architecture. This provides for a nondisruptive migration path for users of these computer systems.

Clark discusses the facilities that allow applications to utilize the full capabilities and capacity of IBM's largest systems. The paper describes how MVS/SP Version 3 supports ESA/370 and its method of providing the user with additional virtual storage capacity, data sharing and isolation, and increased cross-memory addressing capabilities.

Rubsam describes new MVS services that exploit the expanded data addressability of the ESA/370 architecture. Some of the functions require little effort by users to obtain the extra benefits. For example, the library lookaside facility reduces the I/O activity required for program loading, and VSAM hiperspaces improve the hit ratios from the buffer pool.

The advances in technology produce a growing disparity between CPU power and the speed of the secondary storage. Bozman describes a data cache, called a minidisk cache, that is an intermediate store for data from the Conversational Monitor System (CMS) minidisks. This minidisk cache provides a significant performance improvement in systems in which response time is at least partially influenced by I/O operations. The size of the cache is dynamically adjusted by an arbitration process to optimize system performance.

Blandy and Newson discuss the Virtual Machine/Extended Architecture System Product™ that manages the large amount of real and expanded storage available on the new ESA/370 processors. This product creates multiple virtual machines on an ESA/370 system or on a System/370 Extended Architecture system. Operating systems such as MVS/ESA can utilize the full architectural capabilities when running in a virtual machine environment.

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